

### Amendments to the Claims

The following Listing of Claims shall replace any previous listing of claims. No new matter has been added.

#### Listing of Claims

1. (Currently Amended) A water-cooled mold for continuous metal casting, comprising two water-cooled wide copper plates which are arranged opposite to each other in a front-and-back direction and two water-cooled narrow copper plates which are arranged opposite to each other in a right-and-left direction, the two water-cooled narrow copper plates and the two water-cooled wide copper plates each having an inside surface, these inside surfaces altogether defining a cavity of the mold; an upper portion of [[a]] the cavity of the mold being a sprue area and a lower portion of the cavity being a mold cavity area, the sprue area being gradually narrowed in a casting direction and smoothly transited into the mold cavity area, which corresponds to a shape of a slab to be cast; [[an]] the inside surface of each of the water-cooled narrow copper plates being a smooth planar surface; a portion of [[an]] the inside surface of each of the water-cooled wide copper plates that is in the sprue area being a curved surface, and a portion of the inside surface that is in the mold cavity area being a planar surface, the curved surface portion and the planar surface portion forming a continuous smooth surface; and a central point (O<sub>1</sub>) of a top face of the mold being an intersection point of a central axis of the mold with the top face of the sprue area,

characterized in that the curved surface portions of the cavity wherein the inside surface[[s]] of a selected one of the water-cooled wide copper plates [[are]] is formed of such points (P) that they are intersection points of first curves [[1]] and second curves [[2]], the points (P) having three dimensional coordinate values x, y and z in a three dimensional coordinate system with the X axis lying in the planar surface portion of the inside surface of the selected water-cooled wide copper plate and parallel to the top face of the mold, the Y axis parallel to the water-cooled narrow copper plates and the top face of the mold, and the Z axis parallel to the central axis,

wherein with respect to the selected water-cooled wide copper plate, the first curves [[1]] are located in horizontal cross sections at different heights of the central axis of the

mold, and are left-right symmetrical about the central axis, a distance from a peak point of every first curve [1] to the central axis in the direction of the Y axis being  $H+h$ , and a distance from a valley point of every first curve [1] to the central axis in the direction of the Y axis being  $h$ ; every first curve [1] is composed of a curve segment in the middle and two linear segments at two opposite ends adjacent to the water-cooled narrow copper plates, each of the two linear segments having a length  $l_0$  in the direction of the X axis, and the curve segment having a width  $L$  in the direction of the X axis with two opposite endpoints  $[p, q]$ ;

wherein with respect to the selected water-cooled wide copper plate, the second curves [2] are located in longitudinal sections parallel to the water-cooled narrow plates, every second curve [2] is composed of an upper inclined linear segment with a slope  $k$  having an upper endpoint and a lower endpoint, with a ratio  $k$  of a distance from the lower endpoint to the planar surface portion of the inside surface of the selected water-cooled wide copper plate to a distance from the upper endpoint to said planar surface portion, a middle curve segment with a connection point  $(m)$  to the inclined linear segment, and a lower vertical linear segment parallel to the central axis with a length  $d_0$  in the direction of the Z axis and a connection point  $(n)$  to the curve segment; in the mold, every second curve [2] has an overall height  $D+d_0$ , and a distance between the two connection points  $(m, \text{ and } n)$  projected on the central axis is  $d$ ;

wherein with respect to the selected water-cooled wide copper plate, the curve segment of every first curve [1] meets the following equation:

$$y = f(x) = \sum_{i=0}^n a_i x^i$$

where  $n$  has a minimum value of 6,  $a_i = f_i(H, L)$ ;  $f_i$  meets that the second derivatives at the endpoints  $(p, \text{ and } q)$  of the curve segment are continuous;

wherein with respect to the selected water-cooled wide copper plate, the curve segment of every second curve [2] meets the following equation:

$$y = f(z) = \sum_{j=0}^m b_j z^j$$

where  $m$  has a minimum value of 5,  $b_j = [f_j](D, d, k, f(x))$ ;  $[f_j]$  meets that the second derivatives at the connection points  $(m, \text{ and } n)$  are continuous.

2. (Original) The water-cooled mold for continuous metal casting according to Claim 1, wherein  $I_0$  is 0.

3. (Original) The water-cooled mold for continuous metal casting according to Claim 1, wherein  $d_0$  is 0.

4. (Currently Amended) The water-cooled mold for continuous metal casting according to Claim 1, wherein the curve segment of ~~the profile curves in horizontal cross sections of the cavity of the mold~~ every first curve for the selected water-cooled wide copper plate is expressed by the equation:  $f(x) = a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4 + a_5x^5 + a_6x^6$ .

5. (Currently Amended) The water-cooled mold for continuous metal casting according to Claim 1, wherein the curve segment of ~~the profile curves in vertical longitudinal sections of the cavity of the mold~~ every second curve for the selected water-cooled wide copper plate is expressed by the equation:  $f(z) = b_0 + b_1z + b_2z^2 + b_3z^3 + b_4z^4 + b_5z^5$ .

6. (Currently Amended) The water-cooled mold for continuous metal casting according to Claim 1, wherein ~~the~~ third and higher order derivatives at the endpoints ( $p$  and  $q$ ) are continuous.

7. (Currently Amended) The water-cooled mold for continuous metal casting according to Claim 1, wherein ~~the~~ third and higher order derivatives at the connection points ( $m$  and  $n$ ) are continuous.

8. (Original) The water-cooled mold for continuous metal casting according to Claim 1, wherein a ratio of the length of a profile curve of a horizontal cross section of an upper opening of the mold to the length of the linear lines which adjoin the two opposite ends of the curve is selected to be between 1.02 and 1.15, and the length variation of the profile curves of horizontal cross sections in the height direction of the mold is in the

form of curvedly and unevenly shortening.

9. (Original) The water-cooled mold for continuous metal casting according to Claim 1, wherein an inclination angle at which the upper portion of each water-cooled wide copper plate opens upwards and outwards is less than  $12^{\circ}$ .

10. (Original) The water-cooled mold for continuous metal casting according to Claim 1, wherein a ratio of an upper opening width to a lower opening width of each of the two narrow water-cooled copper plates is selected to be 1.0 - 1.05.